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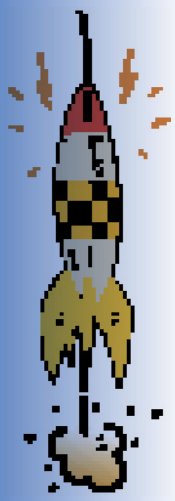
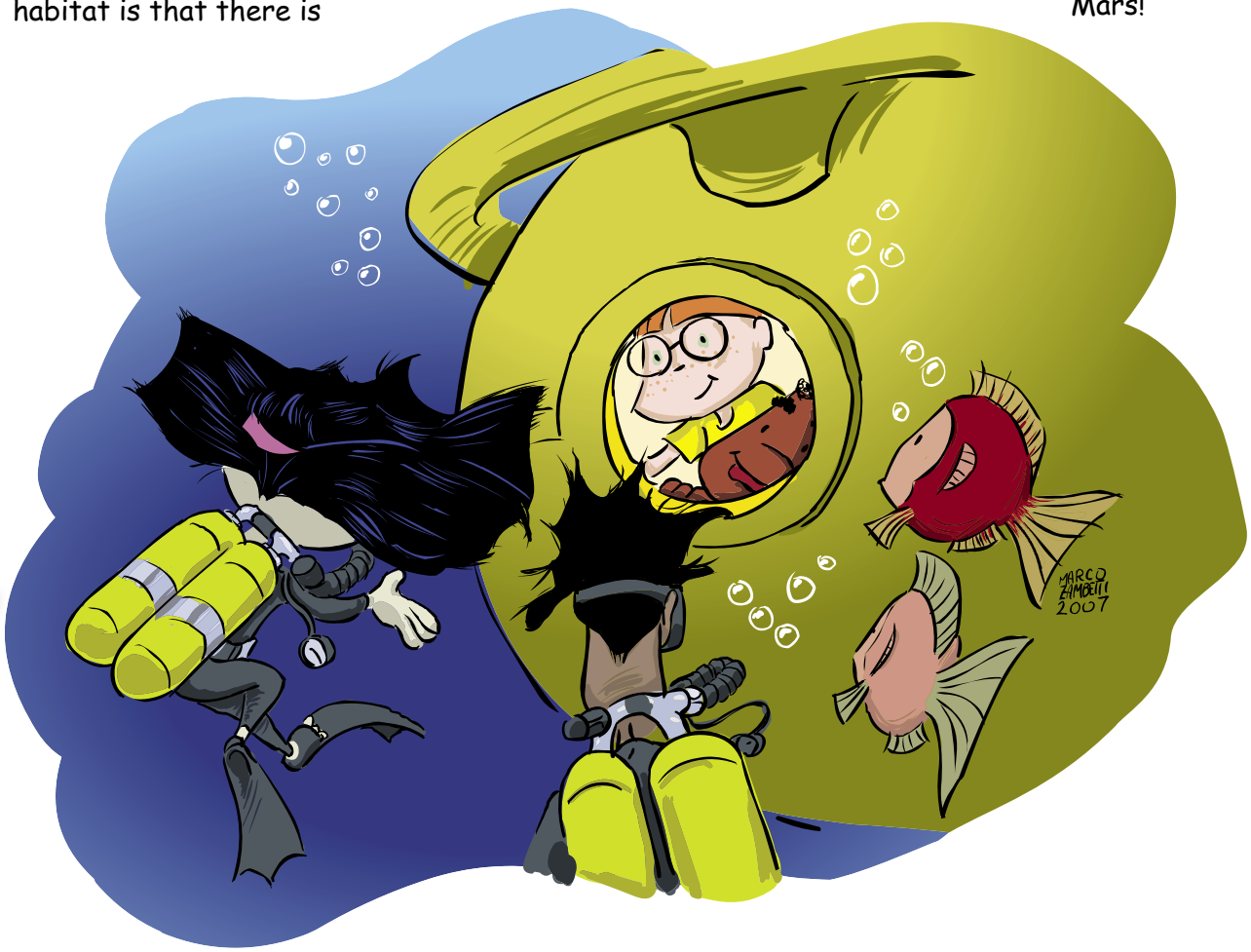
Aquanauts and Astronauts



Imagine if you could live in the ocean, 47 feet below the surface, for 2 weeks without coming up for air! In May 2007, 6 crew members (including 2 astronauts, a flight surgeon, a surgeon from the University of Cincinnati, and 2 habitat technicians from Florida) did just that. They lived in an underwater habitat, called "Aquarius," for 12 days. The underwater project is called NEEMO, which stands for NASA Extreme Environment Mission Operations. Heide Stefanyshyn-Piper was the Commander of this 12th NEEMO mission. You might remember Heide's name—she flew on STS-115 last year.

In addition to their extravehicular activities (diving), the crew of 6 will perform many scientific experiments to help us figure out what happens to their bodies, and how aquanauts perform in an environment similar to space flight. A unique aspect of living in the habitat is that there is increased air pressure inside the habitat because they are underwater, so the aquanauts will actually breathe more oxygen in one breath than when they are on the surface. In a nutrition experiment, we will study the effects of a high-oxygen environment on molecules in the body such as iron, protein, DNA, and fats. We can investigate these effects by measuring chemicals in their blood and urine that will identify which molecules are affected.

When the NEEMO crews live in the underwater habitat, they do not always have direct access to medical doctors to help with medical problems that might come up. Another experiment during NEEMO 12 will test remote controlled robots' abilities to perform medical functions to treat patients. In a separate experiment, there will be computer program that can talk a crew member through the proper steps to treat a medical problem. These technologies will be important for the future of NASA, when we go to the Moon and Mars!



Space Nutrition

Thea's Corner...

Oxidation occurs when a compound reacts with oxygen to create an unstable molecule that can cause damage to surrounding molecules. If there is too much iron in the body, and it is exposed to too much oxygen, its oxidation can cause damage to proteins, DNA, and fats in the body. Just as iron can be oxidized in the body, it can also be oxidized to a form that you know and can see – rust!

In this experiment, you will see how iron will rust faster when it is under a higher pressure, just as it is in the Aquarius habitat.

Materials you will need:

2 pitchers
Water
Steel wool
Tape
3 clear glasses

Tear 2 small pieces of steel wool and tape them to the bottom of two glasses. Turn one glass upside down, and push it to the bottom of the pitcher that is filled with water, making sure that no water enters the glass. Place a glass filled with water on top of it to act as a weight to hold it in place. Because air is trapped in the glass on the bottom, water cannot enter the glass - similar to how Aquanauts have air in Aquarius. Water pushes on the air inside the glass and squeezes the air molecules together, thus increasing the pressure inside the glass.

In a second pitcher, fill with about 1 inch of water, and place the second glass with steel wool upside down. Leave the pitchers overnight, then look at the pieces of steel wool. Was there a difference between them? _____

_____
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Did You Know?

- Aquarius is located 3.5 miles off the coast of Key Largo, Florida. It is 14 meters long and about 4 meters wide, about the size of one of the International Space Station modules.
- Aquarius consists of 3 main compartments—main lock, entry lock, and wet porch. The wet porch is open to the sea through the floor. The air pressure in the habitat keeps the water from coming in, like when you put an upside-down glass in water.
- Inside Aquarius, you will find 6 bunks, a shower and a toilet, instant hot water, a microwave, a trash compactor, a refrigerator, air conditioning, and computers linked to a remote mission control onshore.

Have a safe and fun summer!

We look forward to another exciting year next year!

Web Connections:

Here are some links where you can check out the Aquarius habitat and meet the crew members of NEEMO 12:

www.nasa.gov/neemo
http://www.uncw.edu/aquarius
http://nasadln.nmsu.edu/dln/

Check out Thea's Bonus Page, experiments you can try, and even stuff you may have done at our website:
http://hacd.jsc.nasa.gov/resources/kid_zone.cfm
email: Space.Nutrition.Newsletter@nasa.gov